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To determine whether children's language patterns are learned responses or inherently organized, this study observed children's responses to commands. The 13 subjects were middle class children aged 18 to 30 months. The children were rated as verbally mature, intermediate, or immature; and responses were classified as action, verbal, and relevant. The children's mothers gave syntactically varied commands (adults' and children's language patterns) and semantically varied commands (English and nonsense words). The results showed that the children responded more to the well-formed command. There was a significantly positive relationship between verbal maturity and obedience to command. A significant number of children responded less frequently to nonsense commands than English words except to repeat the command. The only relationship between responses and verbal maturity occurred where the verbally mature child repeated the nonsense command. Three conclusions were reached: (1) the child does make distinctions at some stage, although it may not be evident in speech; (2) the distinctions vary with verbal maturity; and (3) the child has some means of organizing language to control new information. A number of references are cited, and data are included in appendixes. (JS)

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Technical Report VIII

A Study in the Acquisition of Language:

Free Responses to Commands[1]

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Introduction

Empirical investigation of the development of language has usually focused on the child as a speaker, primarily on his spontaneous verbalizations. From this work, a picture of the successive stages of speech of the English-speaking child begins to emerge. Recent studies by Martin Braine (1963), Wick Miller and Susan Ervin (1964), Roger Brown and Colin Fraser (1964), and Ruth Weir (1962, 1966) describe the period in which the child begins to put two or three words together under a unified intonation contour that sounds to experimenters (and mothers) like a rudimentary "sentence". Roger Brown has coined the term "telegraphese" to describe this kind of speech, for the child's utterances contain precisely those items we would want to keep if we were paying by the word. Most often these words are high-information, primary-stress items (e.g., want juice, milk all-gone); in fact, nouns, verbs and adjectives. There are few, if any, "function" words (e.g., prepositions, articles and conjunctions).

The psychologists who have chronicled the development of language to this point have attempted to provide a description of the child's organization of linguistic material by inference from these spontaneous "telegraphic" utterances. For example, the psychologists reason that even at this very primitive stage of speech, the child's utterances seem

to be internally structured. The words in these utterances are not haphazardly ordered; words differ in their positional privileges, i.e. the child who says ball throw does not, in general, alternatively say throw ball. Thus from the evidence of spontaneous speech alone, psychologists can infer that there are at this stage already, in the terminology of the grammarian, "classes" of words, though these classes may differ from those of the mature speaker.

It is our belief, however, that the study of spontaneous speech does not provide a sufficient basis for understanding what the child "knows" about language at various stages of development. There is ample evidence from three decades of failure by the Bloomfieldian linguists that a study of spontaneous speech, however objective and comprehensive, forms a poor basis even for the study of adult language. Linguists such as Charles Fries (1940) have attempted to construct descriptions ("grammars") of English by manipulations of corpora of spontaneous speech; grammars so constructed are no more explicit, and far less illuminating, than the intuitive descriptions of traditional grammarians. Noam Chomsky (1964) has pointed out that the use of this dubious basis for studying children's language multiplies these difficulties by a rather large factor. Therefore a study of children's verbalizations may not provide the kinds

of information needed in developing a theoretical description of the course and process of language acquisition.

Linguistic inquiry has succeeded only when abandoning the collection and codification of natural speech, it began to ask about the adult's knowledge of language -- what has come to be called his "linguistic competence". Modern linguistic theory, primarily under the influence of Noam Chomsky (1957, 1964, 1965), has directed its attention to three aspects of linguistic behavior that are taken to be fundamental to the understanding of linguistic organization: the perception of legitimacy or "grammaticalness"; the perception of ambiguity; and the perception of paraphrastic equivalence.

Adult linguistic competence can and has been tested in a range of situations: by relatively direct means such as asking people for judgments of grammaticalness (Maclay and Sleator, 1960) and for paraphrases (Gleitman, forthcoming); and by less direct means such as demonstrations of the effect of syntax on learning (Marks and Miller, 1964), memory (Savin and Perchonock, 1965), and perception (Miller and Isard, 1963).

In the work we will describe here we have tried to discover whether the child's spontaneous utterances can be taken as direct indications of the child's linguistic competence, or whether, as is the case for adults, spontaneous

speech is a systematically biased source of information. Like the psychologists cited earlier, we are studying the child at the stage in which he speaks "telegraphic" English roughly the period between 15 and 30 months of age.

Do these primitive utterances reflect the child's incomplete knowledge of the language, a "telegraphic competence"? Certainly when the adult has a slip of the tongue we do not therefore question his knowledge of English. It is possible that other limitations on the child's performance (e.g., poor articulatory control, infantile distractibility, limited memory span) account for the childishness of children's speech. By studying the appropriateness of children's reactions to syntactic structure in a semantically controlled situation, we hope to begin to extricate the question of grammatical competence in the child from his performance in uttering speech.

Psychologists and linguists differ, as we have tried to show, in the approach they currently take to the facts of language learning: the psychologist studies the child's performance, while the linguist would prefer, as far as possible, to study the child's underlying knowledge of linguistic structure. The history and orientation of Psychology and Linguistics has also dictated rather different theoretical presuppositions about what is going on in the process of acquiring language.

Most developmental psychologists studying language behavior suppose that the child is endowed with very general organizational and procedural abilities (by no means limited to language) that enable him to form "inductive generalizations" from regularities that exist in the speech he hears. They suggest certain features in the child's linguistic environment that, for example, give hints as to how to form lexical classes, e.g.: differential stress (adjectives are spoken more loudly than articles); positional restrictions (nouns often appear in last position in an utterance, while articles and adjectives rarely do); and semantic consistencies (a noun is very often the name of a person, place, or thing, while a verb is often an action).

Linguists have argued, on the other hand, that the speech of adults, even literate adults, is so chaotic -- interlaced with errors, interruptions, changes of direction, etc. -- as to make learning by inductive generalization virtually impossible; the learner's data simply will not support the kinds of inductions he is called upon to make. Thus linguists take the position that the child comes equipped with very specific principles concerning the nature of syntactic structure from which -- given a corpus of natural speech -- he can deduce the details of the particular language he happens to be born to (Aha, English!).

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Put briefly, and thus too simply, the Psychologist's view is that language is learned; the Linguist's, that it is innate.

Telegraphic speech, to most psychologists, is a reflection of those aspects of the linguistic environment the child has so far been able to isolate. Braine (op. cit.), for example, argues that at this stage the child has learned something about positional restrictions on certain words, although there is much about English that he does not yet know. The innatist position, on the other hand, is that the child's speech fails to be grammatical, not because the child "lacks" the adult grammar, or because he is making interim (wrong) hypotheses about structure, but because of certain other cognitive and mechanical deficits that limit his performance.

In the empirical work that follows, we try to ask about the child's underlying knowledge when his spontaneous speech is at various stages of "telegraphese" in order to test the tenability of the innatist position. Further, we try to approach the question of whether this speech can be taken as a fairly direct and unbiased manifestation of the child's competence, for this question is methodologically important for the collection of relevant data even outside the learning vs innatist controversy. To investigate these

matters, we study the child's responses to speech which is systematically varied. We cannot ask for overt judgments of acceptability, naturalness, or grammaticalness, as is frequently -- and fruitfully -- done in the study of adult linguistic organization. Instead we must infer the child's organization of what he hears from other behavior, from the appropriateness of his responses to various verbal stimuli. In this experiment the verbal stimuli are commands and the appropriate response is, of course, obedience.

In this indirect way we try to ask our subjects, as the linguists do: "Is this a grammatical sentence in your dialect?"

Method

The plan of the experiment was to deliver to very young children a number of commands, varied systematically in syntax and content, and see if they might not react visibly differently to the constructional types. Different responses to stimlui whose semantic content was identical but whose syntactic structure differed might be taken as an indication that the child found one of these sequences in some way bizarre or illegitimate. Such a technique would have obvious analogies to the linguist's approach to informants in which he asks "Would you say this?" or "Is this sentence acceptable to you?" On the other hand, there are obvious and -- we think -- inescapable differences, for here we are asking: "Would you expect me to say this?" or "Is this sentence acceptable from me to you?"

Given that this approach to discovering the child's linguistic competence is a plausible one, there are, nonetheless, enormous difficulties in collecting data of these kinds from young children, some of them because of the nature of the subjects themselves, some of them because of the lack of available techniques for sensible child-watching. We believe we have had some limited success in these ventures, but not without much time and some pain. It seems appropriate because of both the difficulties and

the final fruitfulness of the techniques we used, to present the method and procedure of these experiments in somewhat greater than usual detail. If the reader, in his wisdom, has no intention of stepping onto this uncertain ice, he will probably want to skate rather lightly through this section of the report.

Subjects: The subjects were 13 children, nine boys and four girls, ranging in age from 18 to 33 months.[1] All came from middle-class professional or academic families. All children exhibited some instances of "telegraphese" in their natural speech. Subjects were ranked by their "verbal maturity" from a sample of their natural speech. Median utterance length was the index selected.[2] On the basis of median utterance length, as well as from the other indices, it was clear that the subjects fell into three

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[1]One other child of the minimum age, was dropped after several sessions because he gave neither verbal nor behavioral responses to any of the stimuli. Three of the children had participated for several sessions in pilot studies. At least six months elapsed between participation in the pilot studies and the main experiment.

[2]The Appendix gives the rationale for this choice.

groups. Although there were differences in natural speech within the groups, the most obvious differences are between the groups. The two most sophisticated subjects form a "mature" group, the next seven form an "intermediate" group, and the four least sophisticated form an "immature" group. This ranking also conformed to our subjective impressions of how well these children spoke English.

Stimuli: In pre-experimental sessions with each child, six toys were selected that he could name. For each of these toys a different command (imperative sentence) was constructed with a different verb. Whenever possible three "specific" verbs such as throw (for ball), blow (for horn) and bang (for drum), and three "general" verbs such as find or show or give were used. A set of stimuli was constructed with eight utterance types that varied along two dimensions: the familiarity of the content and the syntactic structure of the utterance. Each toy name appeared in a command of each utterance type.

The utterance types were:

A. All-English forms

1. The "well-formed" command (vfn): A well-formed or "grammatical" command consists of a monosyllabic verb, two "function-words" (a preposition or pronoun, followed by the),

and the noun toy-name, for example:

Throw me the ball!
v f n

2. The "telegraphic" command (vn): A telegraphed command approximates some of the spontaneous speech of our subjects by eliminating the function words; it thus consists of a verb followed by a noun, e.g.:

Throw ball!
v n

3. The lengthened telegraphic command (Lvn): This format increases the length of the telegraphed command to at least the length of the well-formed command by preceding the former with please, and the child's name, e.g.:

Please, Johnnie, throw ball!
L v n

4. The isolated noun command (n): This format again reproduces utterance types noted in the subjects' natural speech; it consists merely of the toy-name itself, e.g.:

Ball!
n

B. Partial-nonsense forms: In the following stimulus-types, we replace either the verb or the function words (or both) with nonsense forms of identical syllable count. Each

nonsense form reflects English phonological rules, and follows the word-stress pattern of the English it replaces. The nonsense "words" are marked by uppercase (X, Z) letters:

1. Well-formed command with nonsense function words (vZn): The function words are replaced by a bisyllabic nonsense word stressed on its first syllable, e.g.:

Throw ronta ball!

v Z n

2. Well-formed command with nonsense verb (Xfn): The verb is replaced by a nonsense monosyllable:

Gor me the ball!

X f n

3. Well-formed command with nonsense function words and nonsense verb (XZn): Here both function words and verb are replaced by the same nonsense material developed for 5 and 6 above, e.g.:

Gor ronta ball!

X Z n

4. Telegraphic command with nonsense verb (Xn): The verb of the telegraphed command is replaced by the nonsense verb:

Gor ball!

X n

Table 1 gives an example of the eight stimulus types in tabular form, and shows the notation used to refer to each.

Table 1 about here

Table 1. Utterance types used in stimuli.

Familiarity of content (Nonsense)	Structure: Child-forms	Structure: Well-formed
No-nonsense syllables	n: Ball. vn: Throw ball. Lvn: Please Johnnie, throw ball.	vfn: Throw me the ball.
Nonsense syllables	Xn: Gor ball.	vZn: Throw ronta ball. Xfn: Gor me the ball. XZn: Gor ronta ball.

A list of 48 stimuli was constructed for each child (recall that since the toys may differ for the different children, the stimuli also differ. It follows that the nonsense words also differ, for we had to avoid inconvenient morphophonemic effects that might interefere with intelligibility). Toy-names (nouns) were randomized in blocks of six, utterance-types in blocks of eight.

Procedure: We had hoped to prerecord the stimuli and present them on tape, so as to achieve a greater degree of control over delivery. However, pilot work showed that the children rarely responded to the recorded stimuli (though they were beguiled by the machine itself). Stimuli therefore were presented live. Since the mother was obviously the most familiar source of speech to the child she presented the stimuli. Mothers were pretrained in the child's absence until their delivery of the various stimulus-types was judged to be natural and consistent.

It was our intention that all stimuli be delivered with mild imperative intonation. Precisely how well this intention can be implemented with the syntactic and morphological deformations introduced we cannot really know. Clearly there are gross intonational differences between, e.g., the well-formed command and the lengthened telegraphed command, if both are pronounced "normally".

Later we describe some partial evaluation techniques for the effects of delivery of the various stimulus types.

1. Pre-experimental "play" sessions: The Experimenter spent one or two preliminary sessions with each subject in his home, and at this time selected the experimental toys and learned the child's name for each. Tape recordings of these sessions also provided the samples of natural speech.

2. The setting: Preliminary sessions for two subjects were held in an unfamiliar laboratory room. Despite the studied barrenness of this environment, the children managed to be distracted by the novelty of their surroundings. All experimental sessions were therefore run in the children's homes. All toys except those used in the experiment were removed from the room.

Three adults were present at each experimental session: the mother, an experimenter (E) and an observer (O). The toys were placed on the floor two to three feet apart within a triangle formed by the three adults. The toys were retrieved or re-separated when necessary.

3. The situation: Since these children were too young for a highly structured choice situation, a "free-response" situation was set up. The adults, and sometimes the child, engaged in normal conversation, and, on occasion, the

mother delivered a stimulus. The child had no set "task" that he know of to perform, but his responses were recorded in various ways.

All experimental sessions were recorded on tape. E and O made independent written records of each trial. These records included reports of objects looked at, touched, and played with as well as verbalizations within the 90-second interval after the stimulus. Similar information was also solicited from the mother after the two independent records were completed. E further recorded the time of occurrence of the child's responses (looked, pointed, ran, picked up, etc.) by tapping on the recorder microphone, and kept a written record of the sequence of movements represented by the taps.

Appropriate opportunities for presenting a stimulus occurred from three to twelve times during each 40 to 60 minute session. We made every effort to ensure that the child noticed the stimuli. Stimuli were not presented while he was engrossed or while he was holding one of the toys. Before giving a stimulus the mother addressed the child by name. If she thought he responded to his name she then gave the stimulus immediately; if she judged he did not attend to his name, she said something irrelevant

and waited for another opportunity. At least three minutes elapsed between stimuli, usually much longer.

After a stimulus was given the adults did not initiate conversation for 90 seconds, although they responded to overtures from the child as they normally would. Total silence was not imposed on the adults because we had found in preliminary sessions that the child then also became silent.

The adults were cautioned not to refer to the toys by name unless necessary in a reply to the child. This rule was sometimes violated - as were most others. A trial was discarded if there had been a serious violation of the procedure (e.g., the mother coaxed the child to get the toy or repeated the stimulus) but minor violations were tolerated (e.g., delivery of a stimulus while a child was holding an irrelevant object such as a handerchief). Decisions to accept or reject were made after the session on the basis of the reports and transcriptions. The judgment to accept or reject a trial was made without knowledge of the stimulus.

Most of the children became progressively less cooperative as the sessions proceeded. Lack of cooperation was apparent from the child's response to his name (covering his ears, shouting "no", running from the room, etc.). We

had several techniques to combat this situation. If the end of the session was near, the experiment was concluded for the day and E then spent several rehabilitive minutes playing with the child, using the experimental toys in the play. If the difficulty arose early in the session, E sometimes introduced a novel toy and played with the child. At other times the adults ignored the child for a while and conversed as on an informal visit.

We had planned to replicate the experiment (reversing the order of the list of stimuli)with all subjects. However, scheduling problems or sickness prevented this with four subjects.

Transcription and collation of the data

The next task was to evaluate the data, hopefully in a way straightforward enough to support some quantitative analysis. This was not altogether simple, and of course it cannot be said with confidence that submitting the data to these procedures did not erase much of its content.

A. Selection of data for analysis:

Two kinds of reports were available for analysis: (1) the written reports of E and O concerning the child's responses, along with supplementary comments from the mother; and (2) the tape-recordings of the experimental sessions. Both these sources of data had to be subjected to considerable comparison and preanalysis before the child's behavior could be evaluated.

B. Evaluation of Delivery: It is possible that a child responds to differences in the delivery of the stimuli by the mother rather than to differences in the stimuli themselves. Given that the mother believes some stimuli are odd, she may communicate this belief to the child. Hence blind judgments of the mother's delivery of the noun portion of the stimulus were made for selected stimuli for two subjects. For Carl, vfn and Xfn were used; for Helen, Lvn and vn. These pairs of utterance types were selected because the material adjacent to the noun is the same in each pair. These subjects were selected because they exhibited large differences in frequency of "touch" responses (see below) for the two utterance types. The appropriate portion of each stimulus, the toy-name, was clipped and a tape constructed of the mother uttering the toy-name only. Two judges were told that subjects obeyed on one-half the trials, as indeed they did. They then listened to the tape of toy-names and decided independently for each noun whether or not they thought the child obeyed the command that contained that noun. The results are unambiguous. The judges' predictions of what the child actually did were no better than chance.

C. Response categories: It was necessary to decide on plausible behavioral criteria by which we might estimate

how the child regarded the various constructional types. It was possible to make a reliable classification of the child's behavior into a limited number of categories.

On many trials the child said or did something; but occasionally he was inert. Further, some of his behavior was judged to be unrelated to the stimulus, e.g. looking at or playing with objects not mentioned in the stimulus, talking about the tape-recorder or the experimenter, etc. All behavior not obviously related to the stimulus is omitted from this analysis. The categories of responses scored were:

1. Action responses

a. Touch: Sometimes the children do precisely what the command implies: they "throw the ball", or at least come into physical contact with the toy named in the command. Any responses that involve such contact with the toy we call"touch", and we take this kind of obedience to be the strongest indication we have that the child has accepted the utterance as a "good" command and is making the natural response.[1]

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[1]It might be argued that merely touching the toy ought to be distinguished from action that indicates that the verb, too, was understood. For example, if the stimulus is Blow on the horn!, one might distinguish between blowing on it and throwing it. However, many of the stimuli lack a verb, so this distinction is not appropriate. It will be shown (see p.29) that this further distinction is in any case quite irrelevant to the responses of these subjects: the appropriate action is independent of the presence of a verb.

b. Look: Often the child looked at the toy named in the stimulus, without touching it. With the three adults in their strategic positions around the room, it was possible to score this response with fair certainty, though obviously with less reliability than for the gross activity implied by "touch", or verbal responses which we could reobserve by listening to tapes of the experimental sessions.

2. Verbal responses

We could readily distinguish three kinds of verbal response that seemed related to the experimental procedure. Of course the children said other things (just as they did other things) that were irrelevant to the experiment.

a. Reply: Occasionally, the child said something that might be taken as a sensible reply or query about the stimulus. For example, in response to Give me the truck, the child might say Mommy get it or Where za truck? Sometimes the sensibleness of the reply was in question: in response to the same command, the child might say Red truck. We call all these responses "reply", because we cannot legitimately distinguish among them.

b. Repetition: We distinguish between replies and repetitions of the commands. We assume that a repetition has occurred when the subject repeats all or part of the command, in the word order given, and without adding any new

material. No attempt is made to guess the intent of the child: some "repetitions" may be questions, others comments, but all are scored the same. Cues to intent, such as question intonation, could not be scored reliably.

c. Negative: The only other verbal response we consider is No!, and its variations (e.g. I won't! or Don't wanna!). These negatives are sometimes conceivably replies to the command. On the other hand, they may merely be responses to having one's name called, to feeling negative in general, to being interrupted, etc. In other words, we could not tell from this kind of response whether or not the child had listened to the stimulus, and it was therefore necessary to distinguish them from replies.

d. Verbal response: For some analyses we combined repetition and replies into a broader category of verbal responses relevant to the stimuli. Obviously negatives were not included.

3. Relevant response: It is useful both conceptually and statistically to develop a "cover" response-category for any response which indicates that the child was aware of the stimulus. After all, when the child makes no response, it is as plausible to suppose that he didn't choose to act on it as that he didn't listen to it. The same is true when the child says No. All other categories

of response indicate that the child heard at least the noun in the stimulus. On occasion, we will want to consider the ratio of the frequency of various response-categories to trials on which we know the subject was aware of the stimulus, i.e. trials on which he made any "relevant" response. When we say the child has made this relevant response, he has either touched or looked at the toy, or repeated or replied to the command.

Results and Discussion

1. Effects of syntactic structure (see Table 1 for classification of the stimuli).

a. Effects for all subjects: Table 2 reveals that all measures of comprehension ("relevant" response, touch, and reply) do seem to be related to the syntactic structure of the command: the percentage of trials on which the child shows some comprehension by any one of these measures drops for both kinds of child-form command; thus the child seems more responsive to well-formed commands, even though the child-forms dominate his own speech. Pairwise comparisons of the cells of Table 2 do not, however, yield results that measure up to the ususal tests of statistical significance, though all point in the same direction.

Combining n and vn still does not yield "statistical significance", but we do not know enough about the variables we are studying, so any such combination of measures is perilous (e.g., if, however, we group nonsense-containing utterances with these on the basis of their internal syntactic structure, the result is statistically significant); but almost any combination of data obscures our arguments for the reality of the distinction between well-formed and child-form commands. Obviously, a less doubtful way to assure ourselves that this very important distinction (between what the child says and what he finds natural in a command) does not represent random fluctuation is to collect some further data by testing more subjects. This work is now to begin: we are testing six more subjects, three of whom represent in overt speech the beginnings of "telegraphic" speech (they occasionally put together two words) and three of whom represent the end of telegraphese (they occasionally say well-formed sentences). A further report on this work awaits analysis of these data.

It is possible to argue that if there really is a difference between the child's response to child-forms and his response to well-formed sentences, that the difference noticed is merely their shortness in comparison to the

Response	Structure: Well-formed	Child-forms	
	vfn	vn	n
Relevant Response	74	65	68
Touch	51	40	39
Reply	38	28	30
Repetition	10	14	13

Table 2

The effects of syntactic structure: percent of trials with a response for well-formed commands (vfn) and for child-forms (n, vn).

mother's usual utterances: length and well-formedness are confounded in Table 2. It will be recalled that we developed a "lengthened" form of the telegraphic command (see Table 1) to test this possibility. Table 3 shows that Lvn is, if anything, less liable to lead to a response showing comprehension than the shorter vn.

Further examination of Table 2 shows that one of our measures does not lead to the same result; this is the percentage of repetitions a child makes of the commands. Repetitions cannot, however, be considered a measure of comprehension. We reserve discussion of these data until we discuss the effects of nonsense.

b. Effects by verbal maturity: An examination of Table 4 reveals that the relationship between well-formedness and obedience may be a function of verbal maturity, as defined by our measures of the child's spontaneous speech (see Appendix A). In Table 4, subjects are ranked on the basis of their spontaneous speech. It can be seen that the "mature" and "intermediate" groups more often obey the well-formed command, but the "immature" group actually prefers the child-forms. Thus the relationship between well-formedness and obedience reported above is largely restricted to the more sophisticated of these telegraphic speakers. It will be noticed, however, that there are anomalies both in the most mature ("Billy") and least mature groups

Response	Structure: Well-formed vfn	Child-forms telegraphic vn	lengthened telegraphic Lvn
Relevant Response	74	65	67
Touch	51	40	35
Reply	38	28	29
Repetition	10	14	12

Table 3

The effects of length: percent of trials with a response for well-formed commands (vfn) and for telegraphic commands (vn) compared to "lengthened" telegraphic commands (Lvn).

Subject	Syntactic Structure: Well-formed vfn	Child-forms vn	Child-forms n
Mature Group			
Andy	83	50	50
Billy	67	67	69
Group average	75	58	59
Intermediate Group			
Carl	58	33	33
Dottie	36	27	15
Eric	38	28	25
Fran	64	54	21
Gregory	57	25	37
Helen	62	38	33
Ira	54	33	50
Group average	53	34	31
Immature Group			
Jeremy	0	33	16
Karen	83	75	80
Linus	42	16	46
Mike	16	50	33
Group average	35	44	44

Table 4

Obedience and verbal maturity: the percent of trials on which a touch occurs for well-formed stimuli, vfn, and two child-forms, n and vn, for each subject. Subjects are ranked on the basis of their spontaneous speech.

(Karen and Linus); thus, while the correlation between verbal maturity and tendency to obey a well-formed command is statistically "significant" [Kendall tau = +.44, $.02 < p < .05$] by the usual criteria, we have not -- by our own more stringent criteria -- provided compelling enough evidence for this phenomenon. Again, we can be sure of this result when our new children's data are analyzed; particularly, by tapping a broader range of verbal maturity -- sheer addition of subjects in the same range cannot answer this question sensibly. We are less interested in this effect (even though it can be made "significant" by statistical criteria if we have the patience to study enough subjects) unless in its inception and conclusion, over broader age ranges, a logical progression of response-type can actually be observed.

c. Summary of the results for syntactic structure: With the data available, we tentatively suggest that well-formed commands are the more effective commands to elicit obedience for at least some children whose speech is telegraphic. This implies that linguistic competence will be underestimated when inferred simply from spontaneous speech, a result anticipated by those who take an innatist view of the emergence of language. Learning theorists can, however, take cheer from the (also tentative) suggestion

that the effectiveness of well-formed commands increases with verbal maturity, implying that there may well be states of competence which developmentally precede the ability to reflect them in speech. The suggestion in our data that child-forms are more effective commands for the less verbally mature points to a telegraphic stage on the way to the competence of the adult speaker.

2. Effects of semantic properties of the stimuli

When we turn to the results for stimuli that contain nonsense, the results are much more dramatic. It will be recalled that approximately half the stimuli contain some nonsense material, in addition to the toy-name. We were interested in asking how the child responded to commands whose semantic properties were not transparent. Notice that this stimulus-situation is probably quite unlike that faced by college sophomores when they perform a task involving nonsense words: the college sophomore is in a position as an expert at English to decide that the nonsense material is indeed meaningless. For the 15-month old child, most English words are novel, and therefore no rational 15-month old should conclude that there is anything inherently peculiar about these nonsense-containing stimuli.

a. Effects for all subjects: Perhaps surprisingly, subjects give a relevant response significantly [$.001 < p < .01$]

less often when the stimulus contains nonsense. As Table 5 shows, relevant responses (either touching, looking, replying, or repeating) are made on 68% of the trials with no-nonsense stimuli and on only 59% of the trials with nonsense-containing stimuli.

At first glance, it might seem plausible that the subject inclines to do nothing with nonsense-containing stimuli because there is no intelligible command for him to obey. But this explanation cannot account for our results: there is as much intelligible material in the stimulus Dog! as there is in the stimulus Gor ronta dog!, and yet the subjects do make a relevant response to the former significantly more often than to the latter [$t = +7.45$, $.001 < p < .01$). Relevant responses occur on 68% of the trials with n and on only 54% of the trials with XZn.

Table 6 shows that nonsense at the beginning of the stimulus (Xfn, XZn, and Xn) interferes most seriously with the relevant response. Note, though, that all such stimuli lack a verb. It seems at first glance that initial nonsense must interfere most tellingly with a relevant response because much semantic information ("Throw...") is lost; while if the second item is nonsense, very little semantic information ("...me the...") is missing. This supposition loses plausibility when we note that the verbless but nonsenseless Ball! elicits the relevant response as often

Table 1. The effects of nonsense: percent of trials with a response for commands without nonsense (n, vn, Lvn, and vfn) and commands with nonsense (vZn, Xfn, XZn, Xn). Significance levels of the differences are based upon analyses of variance.

	Touch	Reply	Repetition	Relevant Response	Touch on trials where there was a Relevant Response
No-nonsense	42	31	13	68	61
Nonsense	33	26	17	59	53
Significance Level	$p<.001$	$p<.001$	$.01<p<.05$	$.001<p<.01$	$.001<p<.01$

	Stimuli with a Verb	Stimuli without a Verb
No-nonsense	vn, Lvn, vfn	n
	69	68
Nonsense	vZn	Xfn, XZn, Xn
	66	57

Table 6

Nonsense and its location and the presence of a verb.

Cell entries are the percent of trials with a relevant response averaged over children.

(68% of the trials) as do the stimuli with verbs (66 or 69 percent of the trials depending on whether or not they contain nonsense). The conjecture is further weakened when the effect of the verb on the subject's behavior is examined: if the verb is present, is the subject more likely to do what it implies? The data are clear here: given that the child touches the toy at all, a verb-related action is no more likely when the verb is there than when it is not. With a verb in the stimulus, verb-related action occurs on 60% of these trials; without a verb, verb-related action occurs on 59% of these trials: a ball is to throw. A child told to Horn! blows on the horn as often as when told to Blow on the horn! provided he comes into contact with the toy at all. Thus absence of the verb is a poor explanation for why initial nonsense (and deletion of the verb) reduces the likelihood of a relevant response.

The problem with nonsense-containing stimuli is obviously not that something is missing, but that something is there, something that is unintelligible and that somehow gives the subject pause. We suggest that unknown material may "turn the child off", or, perhaps, fail to "turn him on". We cannot, from what we have done, say why: perhaps he is distractedly trying to understand the nonsense;

perhaps he finds complicated talk onerous, or assumes it is rarely addressed to him. In any case, if the subject has "tuned-out" before the stimulus ends, he will not hear the noun, he will be unaware of the stimulus toy, and thus he cannot, except by chance, make any relevant response.

It might even be suggested that if the child listens primarily when he recognizes the beginning of the utterance, thus biasedly reducing his linguistic input, he will create for himself a simplified and less chaotic corpus with which to form those "inductive generalizations" that learning theorists rely on to explain his acquisition of the language.

Nonsense affects overt signs of awareness as we have seen, but it also affects obedience independently of awareness. Even when the subject is aware of the nonsense-containing stimulus (i.e., when he does make a relevant response), he is significantly [$.001 < p < .01$] less inclined to obey these commands. As Table 5 shows, when we consider only trials with some relevant response, a touch occurs on 61% of the trials with all-English stimuli, but on only 53% of the trials with nonsense stimuli. The reasons for this, we suspect, are similar to those that cause the subject to miss hearing so many of these stimuli: it is not that some semantic information is missing, but that some incomprehensible semantic information is there,

and he doesn't know what is called for.

A reply is also significantly [$p < .001$] less likely when the command contains nonsense: 26% of trials with nonsense as opposed to 31% of the trials without nonsense elicit a reply. If the child is less likely to tune-in the stimulus when it contains nonsense, then of course he will also be able to reply less often when it contains nonsense.

Table 5 shows there is one response that nonsense does not depress: repetition. It is elicited on significantly [$.01 < p < .05$] more trials with nonsense (17%) than trials without nonsense (13%). As suggested by Table 2, repetition is also more likely to occur with anomalous (child-form) structure.

The tendency of children in this age range to repeat is well-documented. Such imitations resemble spontaneous speech in length (Brown and Fraser, 1964) and complexity (Ervin, 1964) although there are some slight signs that imitation precedes production of certain structures in certain situations (Slobin, 1967).

In the Russian work on inner speech we find a close analogue to our finding that nonsense -- in form or content -- affects repetition. Sokolov (as reported in Slobin, 1966) measured covert verbalizations (muscular activity in the

articulatory system) which are presumably repetitions of the input, for adults reading and listening to their native language and to a foreign language: covert verbalizations are much greater for the foreign language. Furthermore, covert verbalization is greater the more difficult the foreign language. For our subjects it is also the "foreign" language (nonsense) which leads to greater repetition.[1]

What is the function of such repetitions? Perhaps speech perception does have a motor component, and the motoric involvement increases with the difficulty of perception. Perhaps repetition also helps compensate for the transitory nature of auditory input. Finally we suspect that in some instances the repetitions were requests for clarification; occasionally question intonation was clear for a repetition (Ront lubba ball???). Certainly some explicit questions (scored as replies) which involved repetition of the stimulus (Wha, Mama, Gor truck?) seemed similarly aimed at clarification.

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[1]The fact that these young children do overtly what older subjects do covertly is a difference to be expected given the inability to inhibit action of the young (Luria, 1961).

Whatever the function of repetition, its increase with nonsense stimuli appears to be a response to the challenge, to the puzzle, of semantically unknown material. As we argued above, we believe this puzzlement interferes with the child obeying; rather than being impelled to action by the known noun in the command, he is distracted by the unknown material.

b. The effects of nonsense material as a function of verbal maturity: Nonsense decreases the likelihood of a relevant response and of contact with the toy for both more and less mature subjects, and there is no significant correlation between verbal maturity and the magnitude of these effects of nonsense. However, when we turn to the effect of nonsense-containing material upon repetition, we find that the relative effectiveness of nonsense in eliciting repetitions increases with verbal maturity [Kendall tau = +.54, $.001 < p < .01$]. As Table 7 shows, the mature children repeat twice as often with nonsense stimuli as with no-nonsense stimuli; the immature children if anything, repeat less often with nonsense stimuli than with all-English stimuli. Note that the overall tendency of subjects to repeat verbal material

Subject	No-nonsense commands	Nonsense commands
Mature Group		
Andy	4	12
Billy	9	13
Group average	6	12
Intermediate Group		
Carl	6	11
Dottie	4	14
Eric	4	6
Fran	2	5
Gregory	40	58
Helen	22	20
Ira	8	6
Group average	12	17
Immature Group		
Jeremy	17	18
Karen	27	28
Linus	8	6
Mike	17	12
Group average	17	16

Table 7

Verbal Maturity and the Effect of Semantic Conditions upon repetition: the percent of trials on which the subject repeats all or part of the command for commands without nonsense material (n, vn, Lvn, and vfn) and commands with nonsense material (Xn, vXn, Xfn, XXn). The rank order correlation between verbal maturity and the effectiveness of commands with nonsense in eliciting repetitions is + .54 (Kendall tau, $.001 < p < .01$).

decreases with growing maturity (as others, e.g. Brown and Bellugi, 1964, have also found).[1]

Why should semantic anomalies be relatively more effective in prompting the more mature child to repeat than the less mature? We can only speculate that if, as we have suggested, repetitions are a response to the challange of a puzzling stimulus, more mature subjects will rise more readily to the occasion. For the less mature children, some of these nonsense stimuli may be too difficult even to repeat. This notion is consistent with the finding that more mature children are more likely to repeat the nonsense in the nonsense stimuli (see Table 8; this effect is also a significant one: Kendall tau = +.42, $.02 < p < .05$). The material that is repeated may indicate the aspect of the command that puzzles the child, but it also may indicate what part of the command is sufficiently available to allow repetition.

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[1]This finding also has an analogue in Sokolov's work (Slobin, 1966): the greater the linguistic skill of a person, the less the covert verbalization.

Subjects	Percent Repetitions which contain nonsense	
Mature Group		
Andy	67	
Billy	83	
Group average		75
Intermediate Group		
Carl	0	
Dottie	14	
Eric	0	
Fran	50	
Gregory	44	
Helen	30	
Ira	33	
Group average		24
Immature Group		
Jeremy	20	
Karen	14	
Linus	0	
Mike	0	
Group average		8

Table 8

Verbal Maturity and the Inclusion of Nonsense within a Repetition of Stimuli with Nonsense. The rank order correlation of percent repetitions which include nonsense and verbal maturity is + .42 (Kendall tau, $.02 < p < .05$).

Conclusions and Summary

Psychological theories of language development derived from an examination of the child's natural speech take no account of his ability to make linguistic discriminations. The discriminations children do make at various stages of development are not necessarily predictable (or even understandable) from spontaneous speech alone: Therefore in no reasonable sense can recent descriptions of children's language -- no matter how closely the format of these descriptions conforms to transformational accounts -- be taken as grammars of child language. The psychologists of child language have worked altogether without linguistic informants, a theoretical and practical excess of which not even the Bloomfieldian linguists can be accused.

Linguistic theories of language development derive in part from an examination of the natural speech of adults, and in part from a comparison of this observed speech to the organization described in a grammar. A search for relationships among the two leaves little doubt that a child's task in inferring the grammar from a haphazard sample of speech is difficult to the point of improbability. On such rationalistic grounds linguists of Chomsky's general persuasion conclude that knowledge of the structure of natural language must be implicit in

the organism from the beginning. In this they seem to us to proceed very often from the logic that if Skinner cannot explain some feature of behavior, then it must be built in. The suggestion in this experiment that the notion of what is understood to be well-formed changes with increasing verbal maturity seems to be at variance with this theoretical position. However, the nativist position is not sufficiently articulated to be challanged by data of this sort, even were they objectively more compelling than those we have obtained. Once the nativist suggests that the child may indeed construct limited interim grammars (as Chomsky seems to do, 1965, p.202), his position does not seem very different, at least in its predictions concerning the course and process of acquisition, from the view of those who think language is learned from scratch. If competence with language is a function of increasing linguistic maturity, the description of grammatical organization as instinctual does not seem illuminating.

At any rate, for the data we have obtained, it seems most parsimonious to assume that the least mature children organize and cope with what they hear differently from more sophisticated speakers. For example, it appears that for the least advanced group the low-stress "function" words,

in spite of their presumptive familiarity, are syntactically superfluous, and therefore disruptive; they do not fit into the organization of what is heard any more than they appear in what is said, although, as evidenced by the more mature group, they will become part of the input organization before they appear in speech. One need not raise the instinct-learning question to find these facts acceptable.

Children may well be richly endowed with techniques, biases, tendencies, etc., which could aid in language learning. Our results suggest to us some such techniques, although these remain speculations, in no sense confirmed by the data. Rather these speculations were made when we asked ourselves: "Why do children do this? What function could it serve?", about some of our (often incidental) findings. If, for example, the child does "turn off" excessively complex or unfamiliar speech -- as we notice in the responses to semantic anomaly -- this selective listening may well provide a corpus that has obvious relations to a simple phrase-structural grammar. In this sense (even leaving aside the obvious -- except to linguists -- fact that the Mother herself must simplify her speech to the child for her own, if not for the child's convenience), the corpus

of adult speech that the linguist points to as proof that language cannot be learned at all is irrelevant and misleading. Another technique the child appears to use in approaching the linguistic environment selectively is the method of repetition: our subjects repeat what is just beyond them in natural speech, what is just a little bit [illegible]. Whatever their intent or capacity -- whether they [illegible] trying to learn, or whether their limited memory capacity dictates this result -- what they select for this contemplative or rehearsal purpose is also highly selected. In short, we suspect that language can be learned provided the child comes equipped with a set of capacities and also incapacities that assure he will respond selectively to the linguistic environment.

In sum, we have tried to create a situation in which the child could display his current linguistic knowledge, even if he could not do so by producing well-formed sentences. Results suggest (1) that the child makes distinctions not evident in speech at some stages; (2) that these distinctions vary with linguistic maturity, and (3) that the child has ways of biasing his linguistic input so that his flow of new information can be controlled. We conclude that recent studies of developmental linguistics have in general ignored the differences between performance and competence which

in little children may be very extreme, which at the minimum depress the psychologist's impression of the child's knowledge at any stage, and which in all probability bias that view in various unknown directions. We conclude, on the other hand. that the linguist's assumption that the child must covertly know English in advance, or otherwise be hopelessly submerged in a morass of inconsistent language data, seems similarly unwarranted. Perhaps people can learn to talk: to find out how we cannot rely alone either on the observational techniques of psychologists or the innatist presumptions of the linguists.

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Appendix A

Natural Speech

We ranked our Ss with respect to the sophistication of their natural speech. For each child 100 intelligible utterances were transcribed from tape recordings of preliminary sessions. If these sessions did not supply sufficient utterances, more were added from the first experimental session. (Utterances emitted within 90 seconds of an experimental stimulus or in response to the mother's call to the child were not included.)

We examined age, utterance length, intelligibility, and overall frequency of certain grammatical features in a search for a single measure of verbal maturity. The grammatical features of utterances which we examined were verb roots, verbal auxiliaries, verbal inflection, nominal inflection, and the incidence of articles, pronouns and transformational constants.

The transcriber was instructed to be generous in counting words: if there was a suggestion of two words, two words were counted even if they were elided; for instance "wanna" in "I wanna go" would be scored as two words. The transcriber was instructed to err on the side of omission with respect to grammatical features: features were said to be present in an utterance only if clearly heard. (The transcriber was cautioned to avoid report of the presence

of a word or prefix or suffix merely because she expected it to be there.) Exact immediate repetitions of his own utterances by the child were not included in the analysis. Characterization of natural speech in terms of utterance length involved several decisions. First, there is the question of which utterances should be included. Some investigators (Brown and Fraser, 1964) have omitted all single word utterances; since these are often answers to questions, their frequency may reflect the frequency of questions addressed to the child rather than the child's tendency to use one-word utterances in preference to more complicated ones. We chose to include single words utterances because the E seldom directed questions to the child in these sessions; instead she played with toys and the child's speech was either comment about or participation in the play.

A second problem is the measure used to characterize utterance length. The mode did not discriminate among our Ss, so median utterance length was selected as the measure of length.

Intelligibility was measured by the number of consecutive utterances examined in order to find 100 completely intelligible ones. For each grammatical feature the number of utterances in the speech sample which contained an

instance of the feature was determined. Only verb roots were found in the speech of all children. Transformational constants occurred in the speech of only two children (the most advanced speakers on most counts) and are not considered further.

Rank order correlations of length, age, intelligibility and the six grammatical features appear in Table b. All correlations are positive and the majority are significant (Kendall rank correlation coefficient). Length appears to be a better single measure of grammatical maturity than age for our subjects; for all grammatical features the correlation is higher with length than with age. Since many grammatical features add a word to the utterance, a length measure may be considered in part as a way of summarizing the presence of a variety of grammatical features.

Intelligibility enters in two ways into a consideration of verbal maturity. First, since adult speakers are more intelligible than children, intelligibility might be considered an independent index of verbal maturity in our sample of Ss. Second, it may be more difficult to detect the presence of grammatical features in the less intelligible children and we may therefore systematically underestimate their linguistic sophistication. The positive correlations of intelligibility with the various grammatical features

support both these possibilities. On the one hand, intelligibility correlates significantly with the presence of verb roots; since it is relatively easy to hear verb roots this does suggest that intelligibility might be a separate measure for these Ss. However, intelligibility correlates most highly with those features which are hard to hear - sounds at the ends of words - noun and verb inflections. To evaluate the effect of intelligibility as an artifactual basis for the obtained positive intercorrelations of age, length and the grammatical features, partial correlations were performed holding intelligibility constant. Again length appears to be a better single predictor of grammatical sophistication than age; all of the six correlations with grammatical features are higher for length than age. Although the correlations among the grammatical features are reduced when intelligibility is held constant, all correlations are positive and five are significant. Thus intelligibility is not the sole basis for the positive intercorrelations.

The intercorrelations among the grammatical features are of interest. There appear to be two separate factors: a) verb roots, verbal auxiliaries and pronouns and b) noun inflection and articles. Within the groups the correlations are high although there is virtually no correlation between the two groups of features. Verbal inflection, the sixth feature, correlates fairly highly with all other features.

When intelligibility is held constant the only significant correlations are within the first group and between the first group and verbal inflection.

The intercorrelations of grammatical features suggest that for some children the noun phrase develops first: children who use articles also tend to inflect nouns. For other children the verb phrase appears to develop first: the use of verb roots and verbal auxiliaries goes together. The correlation of pronouns with these verb features suggests that pronouns may be used instead of noun phrases by children who use verb phrase features.

There is a suggestion of a sex difference in natural speech. Males tend to have more verb phrase features in their speech - the five children who use verbal auxiliaries are male. Females however tend to have noun phrase features, especially articles, in their speech; three of four females compared to four of nine males use articles. Perhaps the apparently greater proficiency of males in the verb aspect of language is related to their greater motor activity.

Seven of the thirteen Ss had older siblings. We found no evidence that birth order was related to natural speech in this sample.

Table 8. Median length of utterances in natural speech sample.

Subject	Median
Mature Group	
Andrew	3.50
Billy	2.50
Intermediate Group	
Carl	1.[illegible]
Dottie	1.7[illegible]
Eric	1.6[illegible]
Fran	1.48
Gregory	1.43
Helen	1.41
Ira	1.40
Immature Group	
Jeremy	1.16
Karen	1.10
Linus	1.09
Mike	1.06

Table b. Intercorrelations of natural speech measures and the correlation of each measure with age (Kendall rank order correlation coefficient). All correlations are positive, correlations larger than .41 are significant at the .05 level or better.

	Age	Intell.	Verb Rts.	Verb. Aux.	Pro-nouns	Verb Infl.	Noun Infl.	Arti-cles
Median Length	.38	.56	.59	.71	.66	.65	.39	.38
Age		.39	.41	.38	.45	.55	.24	.30
Intelligibility			.47	.31	.29	.53	.62	.50
Verb Roots				.62	.54	.38	.13	.22
Verbal Auxiliaries					.68	.51	.11	.08
Pronouns						.54	.13	.30
Verb Inflection							.58	.42
Noun Inflection								.55

Appendix B

(Analyses of variance for all stimuli)

See Table 1 of the Method section for the utterance types combined in each cell. Row and column totals are averages of the row and column cell entries. No interaction of the effects of syntactic structure and semantic condition reach significance at the .05 level of significance.

Relevant Response

		Syntactic Structure		
		Child	Well-formed	Combined
Semantic Condition	No-nonsense	67	74	68 .001<p<.01
	Nonsense	59	59	59
	Combined	63	66	

B. Touch

		Syntactic Structure		
		Child	Well-formed	Combined
Semantic Condition	No-nonsense	39	50	42 p<.001
	Nonsense	25	35	33
	Combined	32	42	
		.01<p<.05		

C. Touch on trials with a Relevant Response

		Syntactic Structure		
		Child	Well-formed	Combined
Semantic Condition	No-nonsense	59	67	63 .001<p<.01
	Nonsense	41	57	46
	Combined	50	62	
		.01<p<.05		

D. Reply

		Syntactic Structure		
		Child	Well-formed	Combined
Semantic Condition	No-nonsense	29	38	36 $p<.001$
	Nonsense	18	29	24
	Combined	24	34	29
		$.001<p<.01$		

E. Repetition

		Syntactic Structure		
		Child	Well-formed	Combined
Semantic Condition	No-nonsense	14	10	12 $.01<p<.0$
	Nonsense	22	13	18
	Combined	18	12	

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